FPEIS

Final Programmatic **Environmental Impact Statement** for

Pacific Salmon Fisheries Management off the Coasts of Southeast Alaska, Washington, Oregon, and California, and in the Columbia River Basin

National Marine Fisheries Service, Northwest Region
Alaska Department of Fish and Game, Cooperating Agency

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Executive Summary

Contents

ES.1 Purpose and Need for Action

The action considered in this final programmatic environmental impact statement (FPEIS) concerns the National Marine Fisheries Service's (NMFS') and the Alaska Department of Fish and Game's (ADF&G's; NMFS' coordinating agency), review of annual salmon fishery management plans (FMPs) in three jurisdictions. These jurisdictions are the North Pacific Fisheries Management Council (NPFMC) for Southeast Alaska, the Pacific Fishery Management Council (Council) for the Washington, Oregon, and California coast, and *U.S. v. Oregon* for the Columbia River Basin (Figure ES-1). The NPFMC has deferred management authority for the commercial troll salmon fishery in the Exclusive Economic Zone (EEZ) off Southeast Alaska to the State of Alaska. Annual FMPs in these jurisdictions supplement fixed "framework" plans whose management objectives or conservation objectives may also be subject to NEPA review. The annual FMPs apply management measures (in the form of seasons, quotas, bag limits, etc.) to achieve the conservation objectives. Alternatives discussed in this FPEIS vary with respect to management measures, but not conservation objectives.

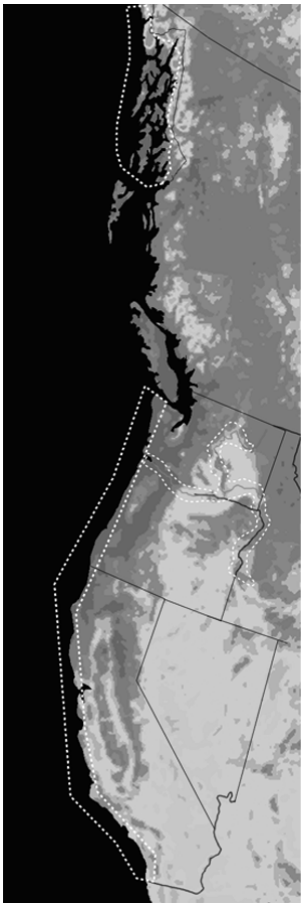

Figure ES-1. The three jurisdictions.

The causes of salmon declines are manifold and are rarely, if ever, solely a result of harvest impacts. However, even the indirect impacts of harvest directed at unlisted stocks significantly affect many salmonid evolutionarily significant units (ESUs). Therefore, an understanding of the impacts of fisheries is crucial to proper design and implementation of recovery programs. The federal action considered here, NMFS' review of salmon FMPs, is an ongoing process that evaluates continually changing approaches of management agencies within and among the three jurisdictions to meet the underlying needs for conservation and utilization. In reviewing and consulting with these three jurisdictions, NMFS must meet its statutory obligations to protect salmonid resources, seek to maximize long-term socioeconomic benefits (i.e., fisheries), and meet its trust obligations to treaty Indian tribes. To meet this need, NMFS has designed this FPEIS to provide review flexibility and an overview of fishing management methods and strategies that could be implemented as part of the annual FMP planning process. The FMPs would be subject to NMFS' review and approval.

NMFS developed the alternatives considered in this analysis via consultation with staff, interactions with cooperating agencies, and oral and written public comments. Numerous possible alternatives were screened according to criteria of relevance, uniqueness, environmental appropriateness, and technical feasibility.

ES.2 Measuring Environmental Consequences

The FPEIS describes short-term, long-term, and cumulative effects on the biological environment, emphasizing effects on listed and unlisted salmon and steelhead ESUs.

Short-term effects are mortalities resulting from fisheries, including harvest and incidental mortality that occurs when fishers capture and then release salmon.

Long-term effects are changes in the abundance of successive generations of the affected stock that may occur as a result of reductions in short-term impacts and the consequent increase in spawning escapement. These effects are qualitatively described.

Cumulative effects are changes to stocks or ESUs that may result from a combination of short- and long-term effects of the actions in the three fishery areas, along with the effects of other past, present, or foreseeable future actions.

Changes to the human environment stem from modifying management measures and the conduct of fisheries. They are described in terms of changes in season duration and structure, harvest, fishing effort, angler benefits, and net income to businesses and commercial fisheries. Social and cultural effects are qualitatively described for the communities of commercial and recreational fishers and for coastal and river communities and Tribes.

ES.3 Alternatives for Each Jurisdictional Area

Table ES-1 summarizes each of the alternatives evaluated for each jurisdiction. Table ES-2 summarizes the potential effects of these alternatives for each jurisdiction.

ES.3.1 Southeast Alaska

The NPFMC manages fisheries in Southeast Alaska, but has deferred development of annual salmon FMPs for this area to the Alaska Department of Fish and Game (ADF&G), a cooperating agency in producing this FPEIS.

ES.3.1.1 Fisheries

Chinook salmon are harvested throughout Southeast Alaska by using commercial hook-and-line gear (trolling), sports gear, gillnets, and purse seines. Commercial trolling accounts for approximately 68 percent of the chinook harvest. Most of the troll catch is taken during the general summer season, which is the focus of the NMFS action and this analysis. Recently, this season has opened on or about July 1, targeting chinook, then shifting to a coho-directed fishery in mid-July or August. Incidental catches of pink, chum, and sockeye occur in these fisheries.

Table ES-1. Summary of alternatives.

Jurisdiction	Alternative 1	Alternative 2	Alternative 3
Southeast Alaska	No Action – Existing management measures would be similar to those used in recent years.	Reduce Chinook Non-retention Fisheries (CNR).	No Incidental Take • All commercial troll and recreational salmon fisheries, with the exception of terminal area experimental fisheries targeting Alaska hatchery runs, would be closed within state and EEZ waters year-round. • Gillnet and purse seine fisheries directed at sockeye, chum, pink, and coho salmon would remain open.
Pacific Coast	No Action – Management measures would be similar to those used in recent years.	Mark – Selective Fisheries • Option A – would maximize the duration of sport fishing seasons and the value of commercial harvest, while meeting conservation standards. • Option B – would meet or exceed conservation objectives, while approximating the fishing opportunity under Alternative 1.	No Incidental Take • No Incidental Take Permit (ITP) would be issued. • No fishery would occur.
Columbia River	No Action – Management measures would be similar to those used in recent years.	Live-capture, Selective, and Terminal Fisheries • Option A – Surpluses of naturally spawning (unmarked) fish would be harvested in areas where the abundance of listed species is low. • Option B – No harvest of surpluses of naturally spawning fish would occur.	No Incidental Take • No ITP would be issued. • No fishery would occur.

Table ES-2. Comparison of alternatives: summary of potential effects. (page 1 of 3)

Region/Alternative	Biological Effects	Human Environment Effects for Southeast Alaska	Cumulative Effects
Southeast Alaska/ Alternative 1— No Action. chinook harvest, Baseline 1[1/]— 282,000; Baseline 2[2/]— 156,000; coho harvest 1.9 million.	– Under high abundance conditions, harvest of chinook salmon would be higher relative to the observed harvest during the Baseline 1 period. – Under low abundance, harvest of chinook salmon would be similar to harvest during the Baseline 2 period. – Harvest of coho and other species are the same as observed.	– Effects would be similar to those currently observed.	– NMFS jeopardy standards would be met for all ESUs. – Improvement in survival conditions under other Hs (habitat, hatcheries, and hydropower) may provide additional fish for harvest and/or escapement[3/]. – Would implement abundance-based management system consistent with Pacific Salmon Treaty (PST).
Southeast Alaska/ Alternative 2— Reduce Chinook Non-retention Fisheries. Set chinook harvest limits for chinook as follows: Baseline 1[1/]— 292,000 Baseline 2[2/]— 162,000 Set coho harvest limits at 1.8 million.	– A small decrease would occur in the exploitation rate of listed chinook stocks (2.6 percent and 1.8 percent for Baselines 1 and 2, respectively). – Reduce incidental mortality of legal size chinook by 4,000 to 10,000 fish annually. – Reduce coho catch by 5 to 15%.	– Net income to commercial fishers would decrease from 2 to 10%, depending on the baseline. – No change to sport fishery would occur. – Direct personal income would decrease 1 to 5%, depending on the baseline.	– NMFS jeopardy standards would be met for all ESUs. – Improvement in survival conditions under other Hs (habitat, hatcheries, and hydropower) may provide additional fish for harvest and/or escapement. – Would implement abundance-based management system consistent with PST. – Management actions would eliminate CNR fishing with small decrease in mortality of listed species.
Southeast Alaska/ Alternative 3— No Incidental Take. No ocean fisheries. Possible increase in net and inside troll fisheries.	– Decrease of 187 Snake River fall chinook would occur for Baseline 1 and 101 for Baseline 2. – Higher escapements for chinook and coho stocks would be affected by the fishery. – Eliminate harvest of listed fish in the fishery. Magnitude of exploitation rate reductions would depend on ESU.	– Loss of $24 to $25 million in personal income would occur from impacts to tourist and fishing industries.	– NMFS jeopardy standards would be met for all ESUs. – Improvement in survival conditions under other Hs (habitat, hatcheries, and hydropower) may provide additional fish for harvest or escapement. – Decrease in ocean harvest to near zero would occur for commercial and recreational fishers.

1/ Baseline 1 represents status quo conditions between 1988 and 1993. This is considered a period of high abundance for chinook salmon.
2/ Baseline 2 represents status quo conditions between 1994 and 1997. This is considered a period of low abundance for chinook salmon.
3/ The 4 Hs are habitat, harvest, hatcheries, and hydropower. Each H impacts stock survival and is, therefore, a factor in developing FMPs.

Table ES-2. Comparison of alternatives: summary of potential effects. (page 2 of 3)

Region/Alternative	Biological Effects	Human Environment Effects for Pacific Coast	Cumulative Effects
Pacific Coast/ Alternative 1— No Action. chinook harvest, 735,000; coho harvest, 142,000.	– Relative to Baseline 1, impacts to wild chinook and coho would decrease.[1/] – Relative to Baseline 2, impacts and harvests would be similar to what is currently observed.[2/]	– Conditions would be similar to what is currently observed.	– NMFS jeopardy standards would be met for all ESUs. – Improvement in survival conditions under other Hs (habitat, hatcheries, and hydropower) may provide additional fish for harvest or escapement. – Harvest approaches would be similar to existing conditions.
Pacific Coast/ Alternative 2— Mark-Selective Fisheries. Option A, Baseline 1, chinook harvest, 702,000; coho harvest, 434,000. Option A, Baseline 2, chinook harvest, 624,000;[2/] coho harvest, 224,000. Option B, Baseline 1, chinook harvest, 559,000;[3/] coho harvest, little change. Option B, Baseline 2, chinook harvest, 607,000; coho harvest, 68,000.	– Fishery-induced mortality of wild chinook and coho salmon would decrease relative to current conditions. – Option A would increase impacts on listed Lower Columbia River and Puget Sound ESUs, while reducing impacts to other listed ESUs.[2/] – Option B would decrease impacts to all listed ESUs.[3/]	– Option A would increase harvest and, thus, income in commercial and sport fisheries in the three northern management areas. – The troll fishery off the central California coast would experience decreased harvest and efficiency. – More benefits would accrue for recreational versus commercial fisheries.	– NMFS jeopardy standards would be met for all ESUs. – Harvest would be similar to existing numbers, but adjustments would be made in species retention, length of season, and other management measures to meet conservation standards.
Pacific Coast/ Alternative 3— No Incidental Take. No ocean fisheries. Greater escapement to inside waters. Some harvest possible.	– Foregone harvest in ocean waters would decrease harvest impacts to essentially zero in these areas (i.e., no harvest). – Escapement to inside waters such as Puget Sound, San Francisco Bay, Columbia River, and Sacramento River would be greater; harvest in these areas is subject to regulation by state and Tribal managers and review by NMFS.	– There would be substantial impacts on commercial and sport fishing communities; a likely major decrease in activities in ocean areas would be seen, but a potential increase would occur in inside waters.	– NMFS jeopardy standards would be met for all ESUs. – Improvement in survival conditions under other Hs (habitat, hatcheries, and hydropower) may provide additional fish for harvest or escapement. – No ITP would be issued; there would be no ocean fishery.

1/ Baseline 1 approximates conditions observed in the late 1980s to early 1990s. Baseline 2 approximates conditions between 1994 and 1997.

2/ Option A – Maintain maximum season duration (fishing opportunity) in each fishery management area while meeting or exceeding conservation objectives for fisheries.

3/ Option B – Maintain maximum escapement of natural stocks (decrease effects on all listed ESUs) and assumed season duration equal or similar to Alternative 1.

Table ES-2. Comparison of alternatives: summary of potential effects. (page 3 of 3)

Region/Alternative	Biological Effects	Human Environment Effects for Columbia River	Cumulative Effects
Columbia River/ Alternative 1— No Action. Baseline 1, salmon and steelhead harvest, 798,000;[1/] Baseline 2, salmon and steelhead harvest, 259,000.[2/]	– Effects would be similar to what is currently observed.	– Effects would be similar to what is currently observed.	– NMFS jeopardy standards would be met for all ESUs. – Improvement in survival conditions under other Hs (habitat, hatcheries, and hydropower) may provide additional fish for harvest or escapement. – Harvest approaches would be similar to existing conditions. – Would incorporate ranges in harvest management, resulting in reduced harvest for coho stocks relative to baseline conditions.
Columbia River/ Alternative 2— Live Capture, Selective, and Terminal Fisheries Option A, Baseline 1, salmon and steelhead, 895,000.[2/] Option A, Baseline 2, salmon and steelhead, 358,000. Option B, Baselines 1 and 2, harvest of all stocks would decrease:[3/] coho—10%; upriver fall chinook—62%; lower river chinook—28%; upriver steelhead—8%; lower river steelhead—same as under Alternative 1.	– The total catch of salmonid and steelhead would be higher under Option A relative to baselines. The total expected catch under Baselines 1 and 2 would be 895,000 and 358,000, respectively, compared to 798,000 and 259,000 under Alternative 1. – Option A, Baseline 1—coho 45% of catch, chinook 30%, steelhead 26%. – Option A, Baseline 2—steelhead 45% of catch, chinook 34%, coho 21%. – Option B would result in decreased catch of all stocks in proportion to percentage of unmarked fish released (Baseline 1 – 661,000 and Baseline 2 – 219,000); coho 10% decrease, upriver fall chinook 62% decrease, lower river chinook 28% decrease, upriver steelhead 8% decrease.	– Gear types and fishing techniques would change. – Expanded use of terminal fishing areas would be necessary. – New fishing methods could increase or decrease efforts. – Wild salmon and steelhead would have to be released. – Salmon and steelhead harvested in some terminal areas may command a lower market price. – Baseline 1—greatest impact would occur for Indian commercial fishers (44% decline), Indian C&S fishers (43% decline), non-Indian commercial fishers (18% decline), Indian C&S fishers in tributaries (14% decline), recreational fishers (7% decline). – Baseline 2—Similar decreases in harvests would occur; however, the decrease in commercial Indian fishers' harvest would be greater (51%).	– Improvement in survival conditions under other Hs (habitat, hatcheries, and hydropower) may provide additional fish for harvest or escapement. – NMFS jeopardy standard would be met for all ESUs. – Selective fisheries would be implemented to reduce impacts to listed fish.
Columbia River/ Alternative 3— No Incidental Take. Potential for some terminal area fisheries in areas without listed salmon and steelhead.	– Similar to Alternative 2. – Production hatcheries would be likely to close. – Incentives to monitor population status would diminish.	– Significant adverse economic, social, and cultural effects on tribal and sport and commercial fishers would occur. – There would be a negative effect on the trust relationship between Indian Nations and the federal government.	– NMFS jeopardy standards would be met for all ESUs. – Improvement in survival conditions under other Hs (habitat, hatcheries, and hydropower) may provide additional fish for harvest or escapement. – No ITP would be issued; fishing opportunity would be greatly diminished.

1/ Baseline 1 approximates conditions observed in the late 1980s to early 1990s. Baseline 2 approximates conditions between 1994 and 1997.
2/ Option A – This option would allow surpluses of naturally spawning (unmarked) fish to be harvested in areas where abundance of listed species was low.
3/ Option B – This option would not allow surpluses of naturally spawning fish.

ES.3.1.2 Alternatives

Under Alternative 1, No Action, the primary measures to conserve chinook salmon would consist of using several management tools. The management measures would consist of setting an overall annual harvest quota relative to the estimated total abundance of chinook in the Southeast Alaska fishery, prohibiting chinook retention during specified times during the general summer commercial troll season (chinook nonretention [CNR]), and closing certain areas with high concentrations of chinook during the CNR fisheries. Additional management measures for troll fisheries would include regulating retention size (28 inches for chinook), regulating gear use, and setting season and area restrictions.

Under Alternative 2, Reduce Chinook Nonretention Fisheries, the overall harvest quota would be set in the same way as under Alternative 1. Additional management measures would, however, be taken in the summer troll fishery to eliminate the need for CNR fishing. Recreational fisheries would remain unchanged from existing harvest regulations.

Under Alternative 3, No Incidental Take, all commercial troll and recreational salmon fisheries, with the exception of terminal area experimental fisheries targeting Alaska hatchery runs, would be closed within state and EEZ waters throughout the year. Gillnet and purse seine fisheries directed at sockeye, pink, chum, and coho salmon would remain open.

ES.3.1.3 Effects on Biological Environment

Effects on salmon harvests and salmon runs under Alternative 1 were calculated by applying the status quo conditions to two baseline periods—1988 to 1993 (Baseline 1) and 1994 to 1997 (Baseline 2)—representing high abundance and low abundance conditions, respectively. The allowable troll chinook harvest under Alternative 1 would average 282,000 for high abundance periods (Baseline 1) and 156,000 for low abundance periods (Baseline 2) compared to observed chinook harvests averaging 219,000 (Baseline 1) and 155,000 (Baseline 2). In general, higher catch levels would be allowed under Alternative 1 than those that actually occurred during the observed years of higher relative abundance. Under low abundance periods, however, the harvest would be similar to harvest under the Baseline 2 conditions. Under Alternative 1, the harvest of coho and other species would be the same as that observed during the baseline periods. For analysis, it was assumed that the coho catch would continue to average approximately 1.9 million per year.

Under Alternative 2, the chief biological effect relative to Alternative 1 would be a small decrease in the incidental take of listed chinook stocks, including those from the Snake River fall ESU and the Lower Columbia and Upper Willamette River spring ESUs. Incidental take of Snake River fall chinook is estimated to decrease approximately 2.6 and 1.8 percent for Baselines 1 and 2, respectively. In absolute terms, however, these changes are small, and the estimated incidental harvest rate would decrease from 4.3 to 4.2 percent under Baseline 1 and from 4.6 to 4.5 percent under Baseline 2.

Alternative 3 would result in a modeled decrease of 187 Snake River fall chinook for Baseline 1 and 101 Snake River fall chinook for Baseline 2.

ES.3.1.4 Effects on Human Environment

Because Alternative 1 serves as the baseline for the alternatives analysis, economic effects are described, but are not compared to other baseline conditions or alternatives.

A change from Alternative 1 to Alternative 2 would decrease net income to commercial fishers by 2.0 and 10.4 percent under Baselines 1 and 2, respectively. There would be no change in economic value to the sport sector.

Alternative 3 impacts on commercial and sport fishers would be substantial, with little opportunity to offset the loss of salmon fishing income by increased participation in other fisheries. Troll and sport fisheries closures would result in closure of the ocean fishery and a total loss of approximately $24 million to $25 million per year in personal income for the local fishing and tourism industries. The largest personal income impacts are projected to occur in Sitka, Juneau, and Ketchikan. Impacts on smaller communities such as Craig, Hoonah, Excursion Inlet, and Yakutat would be proportionally more severe and may have greater effects on employment, income, and poverty levels.

ES.3.2 Pacific Coast

The Council manages fisheries and develops salmon fisheries management plans, subject to NMFS' approval, for this area.

ES.3.2.1 Fisheries

Ocean salmon fisheries in Council waters harvest primarily chinook and coho salmon, with small numbers of pink salmon harvested in odd-numbered years by means of hook-and-line commercial and recreational fisheries. Such fisheries occur from the coastline to approximately 25 miles offshore from the U.S./Canada Border to approximately Point Conception in California.

ES.3.2.2 Alternatives

The Alternative 1, No Action, approach would include time, area, gear, and species restrictions designed to avoid harvest of salmon from listed ESUs, as well as controlled harvest of unlisted stocks for which there are conservation concerns. These management measures would typify those used in recent years.

Under Alternative 2, Mark-Selective Fisheries, management measures would shift primarily from avoidance to selective harvest of hatchery-reared fish. State, federal, and Tribal agencies would use an external mark that fishers could recognize for hatchery-produced chinook and coho salmon intended for harvest. Anglers and commercial fishers would release unmarked chinook and coho, including those from naturally spawning populations in listed ESUs.

There are two options under Alternative 2. Option A, representing a less restrictive application of mark-selective fisheries, would maximize the duration of sport fishing seasons and the value of commercial harvest, while meeting conservation objectives. Option B, representing a more restrictive application of mark-selective fisheries, would meet or exceed conservation objectives while approximating the fishing opportunity under Alternative 1.

Under Alternative 3, No Incidental Take, NMFS would not issue an incidental take permit for a proposed FMP. Thus, no fishing would occur in the ocean. Fish could be available for harvest in inside waters (Puget Sound, Columbia River, San Francisco Bay, Sacramento River, and other estuaries). Promulgating fisheries in these areas is under the control of the individual states and Tribal fishery managers and is subject to separate review by NMFS.

ES.3.2.3 Effects on Biological Environment

Because the alternatives are sensitive to abundance of salmon stocks in different areas and abundance varies, short-term biological effects were measured relative to two baselines. Baseline 1 would approximate conditions observed in the late 1980s to early 1990s, which were characterized by a broad range of ocean survival conditions with relatively high abundance of coho in some years and a relatively low abundance in others. Baseline 2 would approximate conditions between 1994 and 1997, which generally were characterized by very low abundance of coho salmon and increased abundance of chinook salmon in California.

Because Alternative 1 management measures would generally be more restrictive than those applied during Baseline 1, application of Alternative 1 to Baseline 1 conditions would decrease impacts on wild chinook and coho, as well as harvest relative to what was observed in that period. For Baseline 2, application of Alternative 1 would result in impacts and harvest similar to those currently observed.

Relative to Alternative 1, Alternative 2 would result in a decrease in fishery-induced mortality of most stocks of wild chinook and coho salmon. Options A and B would provide a framework of a biologically liberal and a biologically conservative application of the mark-selective fishery approach. Relative to observed and Alternative 1 modeled harvests, Alternative 2 harvests would vary according to baseline, option (i.e., A or B), and fishery management area.

While still meeting conservation objectives (including those for listed ESUs), Option A, as modeled, would increase impacts on the listed Lower Columbia River and Puget Sound Chinook ESUs, but would reduce impacts to other listed ESUs and substantially increase harvest opportunities in most areas. Option B would decrease impacts to all listed ESUs. In practice, other management plans could be developed with intermediate biological effects.

No incidental take permit would be issued for ocean fisheries under Alternative 3. Therefore, no harvest would occur in this area. Escapement would increase to inside waters such as Puget Sound, San Francisco Bay, the Columbia River, the Sacramento River and other estuaries. State and Tribal resource managers set management measures in these inside waters, but they are still subject to NMFS' review.

ES.3.2.4 Effects on Human Environment

Under Alternative 1, effects on the human environment would be similar to existing conditions.

The overall socioeconomic effect of Option A under Alternative 2 would be an increase in personal income from commercial and sport fisheries in the three northern management areas. Communities that have suffered proportionately greater impacts from fishery closures in recent years in Washington, Oregon, and northern California would see the

greatest benefits. Conversely, the troll fishery off the central California coast, which has provided most of the opportunity and landings over the past several years, would experience decreases in harvest and efficiency. The overall socioeconomic effect of Option B under Alternative 2 would be a decrease in personal income in most of the ports along the Pacific coast. The loss in personal income would occur primarily in the commercial fishery.

Substantially more economic benefit would be gained in recreational than in commercial fisheries under Alternative 2, because benefits in recreational fisheries relate directly to the opportunity to fish, and the effort (hence dollars) is expended in fishing rather than harvest.

Alternative 3 would have a substantial impact on commercial and sport fishing communities. Commercial fishers have little or no chance to transfer to other fisheries. Few opportunities to target other species exist in marine sport fisheries. Many sport-fishing-related businesses in coastal communities have ceased operations over the past 10 to 15 years, as a result of declining harvest opportunities. Closing ocean salmon fisheries would likely result in further losses. However, personal income derived from salmon fisheries accounts for approximately 0.15 percent of the total personal income of counties within the region. Personal income from salmon fishing exceeds 1 percent of total county personal income in only one county. Thus, even a total closure of salmon fishing would not be expected to cause substantial impacts in the overall region.

ES.3.3 Columbia River

The states (Washington and Oregon) and the Tribes manage fisheries for this area, with United States District Court (*United States vs. Oregon*) oversight, subject to provisions of the Columbia River Fisheries Management Plan (CRFMP).

ES.3.3.1 Fisheries

Salmon and steelhead fishing occurs throughout the Columbia River system. The "all-citizens" commercial fisheries occur from the river mouth upstream to Bonneville Dam in Management Zones 1 to 5. Tribal commercial and ceremonial and subsistence (C&S) fisheries occur above Bonneville Dam (Management Zone 6) and in tributaries throughout the Columbia River Basin. Recreational fisheries occur throughout the Columbia and its tributaries. Drift gillnets are used in the all-citizens commercial fishery. Set gillnets are the primary gear used in the Tribal commercial fishery. Other gear types used in commercial fisheries include drift gillnets, hoop nets, dip nets, and hook and line gear. Ceremonial fishing typically uses set or drift gillnets, but may include other gear. Subsistence fisheries typically use hoop nets, dip nets, and hook and line gear, but may use gillnets in Zone 6 and occasionally use spears or gaffs in tributaries.

ES.3.3.2 Alternatives

Alternative 1, No Action, incorporates management measures the parties to the CRFMP have used in recent years to achieve conservation objectives. These measures limit or avoid capture of salmonids from listed ESUs and unlisted stocks for which there are conservation concerns by setting harvest quotas, seasons, fishing areas, bag and size limits, gear restrictions, and species retention prohibitions.

Under Alternative 2, Live Capture, Selective, and Terminal Fisheries, management measures would shift primarily from limiting or avoiding harvest of naturally spawning stocks to selective harvest of hatchery-reared fish identified by visible external marks or in species-selective fisheries. Fishers would release unmarked salmonids, including those from naturally spawning populations in listed ESUs. In areas where incidental harvest of listed ESUs was exceptionally low, and harvestable surpluses of (unmarked) naturally spawning fish are available (i.e., Hanford Reach), unmarked fish could be retained.

Only gear types for which incidental mortality of released fish was relatively low would be allowed for non-Tribal fishers or recommended for Tribal fishers in areas and periods where listed salmon are likely to be encountered. These would include, but would not be limited to, tangle nets, hoop nets, dip nets, beach seines, traps, fish wheels, and hook-and-line.

There are two options under Alternative 2. Option A would allow surpluses of naturally spawning (unmarked) fish to be harvested in areas where the abundance of listed species was low. Option B would not allow harvest of surpluses of naturally spawning fish.

Under Alternative 3, No Incidental Take, NMFS would not issue an incidental take permit for a proposed FMP, and fishery-related effects to listed salmon and steelhead stocks would be eliminated.

ES.3.3.3 Effects on Biological Environment

Generally, the total catch of salmon and steelhead would be higher under Alternative 2, Option A. The total expected catch under Baselines 1 and 2 would be 895,000 and 358,000, respectively, compared to 798,000 and 259,000 under Alternative 1. The distribution of catch among species would not change substantially compared to Alternative 1. Under Baseline 1, coho would comprise 45 percent of the catch followed by chinook (30 percent) and steelhead (26 percent). Under Baseline 2, steelhead would comprise 45 percent of the harvest, followed by chinook (34 percent) and coho (21 percent).

Under Alternative 2, Option B, the total expected catch under Baseline 1 and Baseline 2 would be 661,000 and 219,000, respectively, compared to 798,000 and 259,000 under Alternative 1, respectively. Harvests of all stocks would decrease in approximate proportion to the percentage of unmarked fish released. The harvest of coho would have the smallest proportionate decrease (10 percent) because of their predominately hatchery origin. Harvest of upriver fall chinook and lower river chinook would decrease 62 percent and 28 percent, respectively. Upriver steelhead harvest would decrease approximately 8 percent, and lower river steelhead harvest would remain the same.

Escapement goals for some weak stocks would still not be met under Alternative 3, absent additional improvements in overall survival.. Production hatcheries would likely close in order to reduce straying to the spawning grounds, and incentives to monitor the population status of wild stocks would likely diminish.

ES.3.3.4 Effects on Human Environment

Under Alternative 1, effects to the human environment would be similar to existing conditions.

Alternative 2 would likely have significant economic, cultural, and social impacts, including the following:

- Gear types and fishing techniques used by commercial Indian and non-Indian fishers and some Tribal C&S fishers would change, necessitating a transition period to determine which gear types would be best suited to particular circumstances.
- Expanded use of terminal fishing areas would be necessary to access some harvestable stocks. Since Tribes' usual and accustomed fishing areas are limited geographically, some Tribes might lose access to stocks returning to terminal areas outside their usual and customary fishing areas.
- New fishing methods could increase or decrease effort or numbers of fishers needed to achieve a harvest similar to that under Alternative 1.
- Wild salmon and steelhead would have to be released. Some Tribal and sport fishers especially prize wild salmon and steelhead. Tribal fishers consider the right to harvest wild salmon and steelhead to be guaranteed by treaty and an essential part of their cultural heritage.
- Salmon and steelhead harvested in some terminal areas (as under Alternative 2) may command a lower market price than those harvested earlier in their spawning migration.

Baseline 1, a mark-selective fishing alternative that does not allow for additional exploitation of hatchery fish and healthy wild fish runs, would have the greatest impact on Indian commercial fishers (44 percent decline), followed by Indian C&S fishers in Zone 6 (43 percent decline in harvests), non-Indian commercial fishers (18 percent decline), Indian C&S fishers in tributaries (14 percent decline), and recreational fishers (7 percent decline). The percentage of lost harvests under Baseline 2 would be slightly lower than that under Baseline 1, except that lost harvests by commercial Indian fishers would increase to 51 percent because they could not retain upriver fall chinook.

Alternative 3 would have significant adverse economic, social, and cultural effects on Tribal and sport fishers and the businesses that depend on them. Alternative 3 would impact the trust relationships between Indian Nations and the federal government.

ES.4 Cumulative Effects

Cumulative effects are the effects on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes those actions. Cumulative effects can result from individually minor, but collectively significant, actions over time.

Many salmon stocks along the West Coast routinely meet management objectives and are considered healthy, but other stocks are also severely depressed, as seen by the number of listed salmonid ESUs. Harvest has contributed, in varying degrees, to the decline of many of these depressed runs that now require special consideration and protection, but these declines were

rarely, if ever, solely due to harvest. As a result, recovery can occur only if the combined effects of all actions that adversely affect these stocks are adequately addressed.

Harvest, which is the subject of this FPEIS, plays a critical role because it must be constrained sufficiently to provide adequate escapement and the opportunity for listed species recovery, particularly in the short term. Remedies in other action areas often take time to implement and even longer to improve survival of the species (e.g., a planned dam removal or changes in forest practices will not provide immediate survival benefits, but may be critical to long-term recovery).

NMFS often characterizes actions that affect recovery of salmon and steelhead populations as belonging to one of the All-H categories: habitat, hydropower, hatcheries, and harvest. In general, scientists agree that efforts will be needed in all of these categories to achieve recovery of listed species.

The sequence of proposed alternatives from Alternative 1 to Alternative 2 to Alternative 3 involves decreasing levels of harvest effects on listed fish. In general, harvest reductions will lead to increased escapement; however, the magnitude of that increase, and thus the cumulative effect, depends on the following:

- The status of the affected stocks
- The size of the existing harvest
- The distribution of each stock relative to each fishery
- How much mortality actually occurs between the affected fishery and the spawning grounds

The distribution of stocks, relative to the fisheries under consideration in this FPEIS, is also an important determinant of cumulative effects (e.g., some stocks have a very broad distribution and will benefit from harvest reductions in the ocean and inriver fisheries). As a result, the cumulative effects or interactions between fishery jurisdictions are stock-specific, and the interactions between jurisdictions are quite limited for many of the stocks.

Implementation of the proposed alternatives would regulate harvest to affect escapement; however, increasing escapement will not necessarily result in recovery. For many, if not most, listed stocks, habitat degradation has reduced the productivity of populations to a level where they can no longer replace themselves; this leads to long periods of decline. Harvest reductions can limit this lost productivity to a point, but they would do little to increase the inherent productivity of the population.

Mass marking of chinook and coho salmon may affect current management schemes for salmon because it requires changing methods for gathering and interpreting data from coded wire tags (CWTs), the primary tool fishery management agencies use to evaluate changes in salmon production, distribution, and exploitation. The analyses in Alternative 2 for the Pacific Coast and Columbia River fisheries assumed that outstanding data management problems could be resolved so that mass-mark, selective fisheries for chinook and coho could be fully implemented in ocean and in-river fisheries. If the data problems can be resolved, there are likely to be additional costs for management. These were not considered in the analysis. It is likely that the mass mark, selective fishery option would not be viable in all cases and would, instead, be considered and implemented on a case-by-case basis.

Complications related to the viability of the CWT management system relate primarily to the implementation of selective fisheries, rather than mass marking itself. The ability to implement selective fisheries that target the mass-marked fish would, therefore, be an added benefit of the program if the associated technical problems can be resolved.